



ACEWATER Phase II: National Strategy on Water Sector Human Capacity Development for Ethiopia

Final Report on National HCD Framework for Ethiopia

**Ethiopian Institute of Water Resources
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List of Acronyms

AUC:	African Union Commission
BCM:	Billion Cubic Meters
EiWR:	Ethiopian Institute of Water Resources
HCD:	Human Capacity Development
MoAL:	Ministry of Agriculture and Livestock Resources
MoWIE:	Ministry of Water, Irrigation and Energy
NEPAD:	New Partnership for African Development
SNNPR:	Southern Nations, Nationalities and Peoples Region

TVET:	Technical and Vocational Education Training Institutes
EWTI:	Ethiopian Water Technology Institute
AWTI:	Arba Minch Water Technology Institute
IoT:	Institute of Technology

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1. Introduction

1.1. Background

The second phase of the project on NEPAD Centres of Excellence on Water (ACEWATER Phase II) had the aim of expanding the network to central and eastern African regions and supporting the establishment of Human Capacity Development Programme in the water sector. The central and eastern Africa Centres of excellence in water has been established with 4 institutions in 4 countries. The Water sector human capacity development programme with the support from UNESCO has been under implementation in Ethiopia since September 2018. The project is supporting the implementation of the African Water Ministers' declaration urging AUC and NEPAD Centres of Excellence to develop a "Human Capacity Development Programme for junior professional and technician level capacity challenges in the water sector" at national level in the CoE countries.

As a member of the AU-NEPAD CoE in Water for Central and Eastern Africa, the Ethiopian Institute of Water Resources (EiWR), Addis Ababa University is mandated to develop a water sector human capacity development framework for Ethiopia. This work is expected to run from September 2018 to January 2019. The framework will be an important input to assist the development of water sector human capacity in the country, which is generally characterized to be unplanned and fragmented in nature in the past.

1.2. Objectives and deliverables

The objective of the project on water sector HCD is develop a framework (national strategy) that addresses the development of water sector human capacity mainly addressing junior professionals and technician level capacities. It also intends to prepare a Monitoring and Evaluation (M&E) Framework for tracking the progress of the framework.

The major deliverables of the water sector HCD activities are:

1. Draft Work Plan of Activities;
2. Sector-wide Assessment Desk Study Report;
3. Draft National Framework;
4. Validated National Framework on Human Capacity Development including Implementation and M&E Frameworks;
5. Technical and financial report.

2. Approach and Methodology

2.1. Basis for national water sector HCD

Water is a basic social and economic good which is responsible for a wide range of social and economic development endeavors of nations. Access to adequate water of good quality for a wide range of purposes is limited in Sub-Saharan Africa. Several of the SDG goals are strongly linked to water and therefore improving water service in Africa is a top priority of nations. One of the key challenges in Africa and in Ethiopia as well is limited human capacity in the sector. Ethiopia has large water resources potential, but the degree and quality of water services is still very low. As such, a water sector HCD framework with appropriate monitoring and evaluation plans would play a large role in enhancing the sectors' bottlenecks in human capacities. There are key targets related to water and food that Ethiopia has aligned in its development plans to SDG goals. Ethiopia is among the countries that are severely affected by the impacts of climate change and variability. As such building the resilience of communities to drought is a priority for national security. Achieving these goals definitely largely rely on availability of skilled personnel in the water sector.

2.2. Approach to the development of the water sector HC framework

Upon signature of the contract to carry out the water sector HCD framework with UNESCO, the Ethiopian Institute of Water Resources (EiWR) was immediately engaged in the activities. Detailed work plan of activities was prepared to guide the follow up activities. The activities and approaches followed are as follows.

Desk study

The first important deliverable was the "Desk study report", which was submitted late October 2018. This was to assess the existing situation of the water sector human capacity in Ethiopia. The assessment covered the general conditions of the water sector, human capacity status and challenges. For the desk stud, the following methods (sources of data) were used to obtain information.

- Various sector-wide government plans, policies and strategies
- Regional government plans
- Consultations with Ministry focal persons
- Consultations with representatives from various Universities
- Consultations with Technical and Vocational Training Institutes (TVETs)

Data collection on sector's HCD and National consultations

For drafting the water sector HCD framework, detailed data is required. The data mainly is regarding the human capacity status and capacity development needs in the water sector. For this, data was collected both at Federal and Regional levels using appropriate data collection tools

prepared ahead of time. The tools are questionnaire types designed to capture key information related to HCD. The first tool is for collecting data on the existing situation of the water sector HC, while the second tool is for data on HCD needs and priorities.

Consultations with national stakeholders, both at Federal and Regional levels were also made following the data collection. The consultations were made independently at various federal and regional level institutions concerned with water; and hence not in the form of a workshop. Consultations at the Federal levels are made at three Ministries involved with the water sector: Ministry of Water, Irrigation and Energy (MoWIE), Ministry of Agriculture and Livestock Resources (MoAL), and Ministry of Health (MoH). Regional consultations are made with water sector bureaus in three regional states (Amhara, Oromia and SNNPR). The consultations are made immediately after data collection at the same stakeholders. It gave a valuable feedback on the national water sector human capacity needs and priority areas which helped in sorting out the HCD framework.

Major issues in national consultation

The national consultations are made at different institutions at federal and regional levels independent following data collection on existing situation on water sector HCD. There are generally several common issues raised by these institutions. The summary of the major issues raised during consultation are:

- Continuous need-based tailored skills development training programs in TVETS:
 - Drilling technologies
 - Spring development
 - Water harvesting techniques
 - Water quality monitoring
- University trainings
 - Surface and ground water resources assessment
 - Hydrological data collection and analysis
 - Floods and drought analysis and modeling
 - Irrigation systems management and performance improvement
 - Geo-spatial analysis for water resources
 - Climate change and impacts on water resources
 - CAD for water resources systems
- Water related laboratories: nationally, there is a shortage of water laboratories. As such establishing standard water quality laboratories (federal and regional levels) stressed.
 - Water quality laboratories
 - Hydraulics laboratories
 - Irrigation and soil physics laboratories

Draft national HCD framework

Having collected data both at Regional and Federal levels, the HCD framework was drafted for technical and professional level human capacities in the water sector. The water sector HCD framework mainly covers three professional sub-areas in the water sector; namely water supply, irrigation and water as related to health.

Validation workshop

Data collected at federal ministries and regional states are both secondary and primary. While the secondary data are extracted from policies, strategies, reports, etc., the primary data were collected from key personnel in the organizations, which could have some sort of subjectivity depending on the person the data is collected from. The primary data were collected through surveys, and are mainly related to the status and needs in water sector HCD as expressed by key personnel at different institutions collected in the form of interviews. As such, data needs to be validated and agreed upon by stakeholders. Data could be validated through triangulation using data obtained through various methods; or a workshop can be made where the findings could be presented and inputs collected to validate the data. In the present case, although national consultations were made, this kind of consultations may not be as exhaustive required, and the framework prepared needed to be validated.

A validation workshop was organized to present the data and findings, and the draft HCD framework to key stakeholders, obtain feedback for improvement and validation. As such, a workshop comprising of expected 30 key participants from federal ministries, universities, regional water sector bureaus, and from companies engaged in the waster sector development was conducted (19 attended). Useful feedbacks were collected at the workshop, and participants raised key concerns and needs about the development of water sector human capacities and reflected on several findings and data which were key to improve and validate the data and the draft framework. The minutes of the validation workshop is included in Annex 3.

The key points/recommendations raised by the participants of the validation workshop are:

- Well planned delivery of short term tailored trainings in various professional areas in the water sector at University and TVET levels; including water resources assessment and planning, water resources modeling, CAD in water resources design, Water resources development projects management, geo-spatial analysis, irrigation system performance monitoring, water quality management, project management, etc.
- Launching water related technical trainings in the existing technical, vocational, education and training institutes (TVETs) and expanding more for the same. Trainings proposed include water well drilling technologies, operation and maintenance of water infrastructure, water quality monitoring, etc.

- Establishing state-of the art water laboratories for the ministries and selected universities/research institutes/training institutes to assist in research and human capacity development/training;
- Improving pay scale for technical staff engaged in the water sector, as technical issues related to design, installation, operation and maintenance are the main challenges to the sector;
- Extension services in the water sector: extension in the water sector is limited and this resulted in poor water management and service delivery. Extension workers in irrigation and water supply sectors need to be trained and deployed.





Figures 1 & 2. Validation workshop (23 January, 2019, Addis Ababa)

Accommodation of feedback

Inputs (concerns) obtained from stakeholders who participated in the validation workshop as stated above are well considered to validate the data and address issues that need further attention. Accordingly, appropriate modifications to the draft framework are made to suit the needs of the nation and key stakeholders. Key issues considered and well addressed in the framework based on feedback are tailored trainings, laboratory services, salary considerations for water professionals, extension services in the water sector, etc.

2.3. Rationale for national water sector HCD

Water is a basic socio-economic good on which all life depends and is important for all economic and social well-being. The amount of water globally available is sufficient for the world population. However, the spatial and temporal distribution of the global water resources is so uneven that a third of the global populations already live in areas of water scarcity. Climate change is adding another challenge to the already existing global erratic distribution of the water resources. Water management challenges are among the top global agenda to ensure social security and hence attain water related SDG goals.

Ethiopia, is not different, water management is among the key priorities in the country. The country has reasonably high amount of surface and sub-surface unutilized water resources. Like other sub-

Saharan Africa countries, Ethiop’s economy heavily depend on small scale agriculture, which is in turn has a very high dependency on rainfall. Rainfall variability and inadequacy causes significant yield reductions and leaves million food insecure. This requires moving away from dependence on natural rainfall; and harness various water sources for agriculture, which indeed calls for adequate human capacity in the sector. The country has over 122 BCM of surface water and about 40 BCM of annual renewable groundwater resources. However, the country has generally little utilized its water resources for various reasons, among which lack of human technical capacity is the main one. About 80% of the country’s surface water resources are trans-boundary. Irrigation potential of the country estimated about 5 to 6 Million ha; however, only about 20% has been so far developed. Thus, in order to utilize the water resources for socio-economic development of the nation, building human capacities in the sector is crucial.

On the other hand, access to domestic water supplies in Ethiopia is a big challenge given the fact that 80% the population is rural and scattered with poor water and sanitation. Although the country has improved significantly in WaSH services, the quality and reliability of the services is still a challenge. Even in areas where basic water supply infrastructure is available, rate of malfunctionality is high, which are indeed mainly relate to technical capacities. This requires building the sector’s human capacity both at professional and technical levels. Sanitation and water-related health issues deserve huge attention in the country for the fact that in rural Ethiopia, there is large gap in achieving basic sanitation services.

3. Existing water sector HC status and needs in Ethiopia

3.1. Federal level water sector human capacity status and needs

At federal levels, organizations (public) involved in the water sector were consulted for human capacity status and needs: Ministry of Water, Irrigation and Energy; Ministry of Agriculture and Livestock Resources, Construction Works Design and Supervision Corporation are the organizations consulted. The consultations were made with Human Resources as well as technical departments of the organizations. The summary of human capacity status and needs based on specializations as obtained from consultations is indicated in Table 1.

Table 1. Total required and actual numbers of experts by profession at federal levels in 3 key organizations engaged in the sector (December 2018) (Construction Design and Supervision Works Corporation; Ministry of Water, Irrigation and Energy; and Ministry of Agriculture and Livestock Resources)

Specialization	Required Number of experts	Actual Number of experts
Hydraulic Eng.	166	107
Irrigation Eng.	178	96

Civil Eng.	105	80
Hydrology and water resource management	122	92
Water Supply Eng.	95	80
Soil and Water Conservation Eng.	196	82
Electro Mechanical Eng	62	21
Others	702	249
Total average	1626	807

(Source: Consultations with the organizations/ministries at federal levels engaged in the water sector)

3.2. Water sector HC status and needs at regional levels

3.2.1. Oromia Regional State

The water sector human capacity status and needs for Oromia by specialization is shown in Table 2. The data comprises of 5 organizations (bureaus) involved in the water sector in the regional state.

Table 2. Total required and actual numbers of experts by profession in Oromia region (December 2018) (Health Bureau, Water Resources Development Bureau, Irrigation Development Authority, Design and Supervision Enterprise, and Construction Enterprise)

Specialization	Required Number of experts (Regional head offices, Zonal offices and Woreda level)	Actual Number of experts (Regional head offices, Zonal offices and Woreda level)
Hydraulic Eng.	672	351
Irrigation Eng.	781	386
Environmental Health	396	227
Sanitary Eng.	342	198
Civil Eng.	115	82
Water Resource Management	586	316
Water Supply Eng.	338	189
Soil and Water Conservation Eng.	684	358
Electro-Mechanical Eng.	348	184
Others (technical levels)	1,445	1,250
Total average	5,707	3,541

3.2.2. Amhara Regional State

For Amhara regional state, 4 organizations (bureaus) involved in the water sector were considered for consultations for their water related human capacity status and needs. Data on existing water sector HC in various sub-sectors were collected through consultations and their needs (including vacant posts) were also obtained. Table 3 shows the summary of the same.

Table 3. Total required and actual numbers of experts by profession in Amhara region at 4 organizations engaged in the water sector (December 2018) (Water, Irrigation and Energy Development Bureau, Agriculture and natural resources bureau, and Health bureau)

Specialization	Required Number of experts	Actual Number of experts
1. Water, Irrigation and Energy Development Bureau and Zonal Departments [15 zones]		
Water Supply and Environmental Engineer	95	86
Irrigation Engineer	92	82
Electromechanical Engineer	87	78
Civil Engineer	23	21
Hydrogeologist	48	43
Geologist	23	20
Energy technologist	15	14
Hydraulic engineering	19	17
Water resources engineering	5	4
Agricultural engineering	3	3
Soil and water engineering	3	2
Engineering geology	2	2
Biology	4	4
Meteorology	2	2
Land administration	1	1
Agronomy	2	2
Environmentalist	2	2
Socio-economics	3	2
Surveyor (diploma)	41	37
Automechanic (diploma)	15	14
Electrician (diploma)	30	27
Others (Technical level or at woreda) [181 Woredas and 3216 kebeles]		
Water Supply Engineer	543	447
Hydrogeologist	181	168
Energy technologist	181	172
Surveyor (diploma)	181	162
Automechanic (diploma)	181	163
Electrician (diploma)	181	180
Plumber (diploma)	362	337

Water extension workers	6,432	0
Sub total	8,757	2,092
2. Amhara Agriculture and Natural Resources Bureau [12 zones]		
Water Resources Engineering	13	9
Irrigation Engineering	13	8
Hydraulic Engineering	26	18
Agricultural Engineering	13	10
Civil Engineering	1	0
Soil and Water conservation engineering	12	8
Hydrologist	1	1
Geology specialist	1	0
Others (Technical level or at woreda) [153 Woredas]		
Water Resources Engineering	153	92
Irrigation Engineering	153	78
Hydraulic Engineering	306	180
Soil and Water Conservation Engineering	153	105
Agricultural Engineering	153	103
Sub total	998	612
3. Amhara Health Bureau and Zonal Departments [15 zones]		
Water quality Specialist	48	16
Sanitation Specialist	48	16
Hygiene Specialist	48	16
Others(Technical level or at woreda) [181 Woredas including urbans]		
Environmental Health Officer	543	181
Sub total	2,459	1,351

3.2.3. SNNPR region

The summary of water sector human capacity status and needs by specializations for the SNNPR obtained using consultations with stakeholders at regional levels are summarized in Table 4.

Table 4. Total required and actual numbers of experts by profession for SNNPR region (December 2018) (Health bureau, Water and irrigation development bureau, Design and supervision enterprise, and Water works construction enterprise)

Specialization	Required Number of experts (Regional head offices, Zonal offices and Woreda level)	Actual Number of experts (Regional head offices, Zonal offices and Woreda level)
1. Water and Irrigation Development Bureau		
Hydrologist (Head office)	6	2
Electro Mechanical Eng.	4	2
Environmental/sanitary Eng.	5	

		2
Water resource Management Eng.	5	3
Civil Eng.	5	3
Zonal and woreda levels in various specializations	816	408
Sub total	816	416
2. Agriculture and Natural Resources Bureau		
Irrigation Eng. (Head office)	2	2
Hydraulic Eng.	4	3
Soil and Water Eng.	4	3
		2
Agricultural Eng.	2	
Zonal and Woreda levels in various specializations in water	680	544
Sub total	682	544
3. Health Bureau		
Environmental Health (Head office)	3	2
Public Health	5	3
Health Officer	1	1
Agricultural Economics	1	1
Zonal and Woreda level in different specialization areas related to water	136	136
Sub tub total	146	143

4. Water sector National HCD Framework

a. Basis for water sector HCD framework

The UN Sustainable Development Goals call for substantial stride in developments and services related to the water sector. This encompasses access to water and sanitation, food security, environmental sustainability, etc. In line with the SDGs, the government of Ethiopia has set forth a 5 years (2016-2020) National development agenda known as the “Growth and Transformation Plan (GTP-II)” in which the country made sectoral development plans including human resources development. Thus, the basis for the water sector human capacity needs is mainly aligned with plans in the GTP-II and other related sectoral human capacity development plans of the ministries and bureaus. In addition, the Abuja Ministerial declaration on water (2002) on the launch of AMCOW was used as a guiding reference.

During the preparation of the HCD framework, an attempt has been made to link the water sector human capacity development with the general country level strategies in sector development specific to human resources capacity. It anchored on three major strategic areas:

- Progressive sector based development in human resources
- Improve technical and leadership capacity
- Accelerate institutional transformation to enhance sectors' implementation capacity

The HCD framework for water sector therefore, tailored with the above three strategic dimensions which are assumed to transform the water sector thereby enhancing the government's ability in water service delivery to citizens.

b. Strategic Dimensions in Water Sector Human Capacity Development Framework

Strategy 1: Progressive development in human resources in the water sector

One of the major challenges in developing countries like Ethiopia is the shortage of skilled human resources in the service delivery to the general public. Although the country strives to deploy the required workforce in different water sector especially at the lower administrative levels, it was not possible to fulfill the target set by national Growth and Transformation Plan (GTP I&II). This has also huge implications in achieving all the development agendas set by the SDG which will expect to be realized by the end of 2030. Under this strategy it is planned to address the human resources gap in different water sector across the major three regions and at federal level through the progressive development in human resources.

A detail situation analysis and needs assessment has been conducted in identifying the critical gaps in each sector and administrative level. Based on the assessment, it is proposed to frame the progressive development of human resources for the water sector. As a result the following key inputs have been also envisaged to achieve the target set in the framework:

Based on the assessment results obtained from the desk study, interviews, and consultative validation workshop the target set in Table 5 by the year of 2030, a yearly progressive increment in filling the gap identified as a critical shortage in human resource of different water sectors both at regional and federal level has to be realized. Hence, the following intervention areas for implementing the strategy need to be in place:

- 1) Hire and train new mid-career and technical staffs to the sectors
- 2) Retain existing experienced professional staffs through different mechanisms (such as incentives, training opportunities, changing working environment, etc.)
- 3) Explore the existing university-industry-linkage (UIL) arrangements to fill the gap via providing training opportunity

- 4) Mobilize additional financial resources to train more mid-career and technical staffs
- 5) Encourage Public Private Partnership (PPP) arrangements in delivering services

Table 5. Sector based HCD framework plan to improve water sector human resources capacity and technical skill that supports in achieving sustainable development targets in sector’s development at Federal and major regional administrative and professional levels:

Organizational level	Water sectors ministry/ organization/bureaus	Required number of mid-career and professional experts per sector	Required number of staffs at technical level	Actual number of experts in the sector at mid-career and Professional level	Actual number of staffs at technical level	Gap in the human resources development in the sector (%)	Planned human resources capacity development in achieving the required target at the end of 2030 (%)	Key indicators in achieving the target	Means of achieving the target
Federal Level	Agriculture and Livestock Resources	33	0	19	0	42.4	100	<ul style="list-style-type: none"> - A 4.2% increment in the human resources development in the specific sector per year - Reduced experienced staff turnover - Community satisfaction in the service delivery - Substantial budget increment in the sector to improve service delivery 	
	Water, Irrigation and Energy	407	0	189	0	53.6	100	<ul style="list-style-type: none"> - A 5.4% increment in the human resources development in the specific sector per year - Reduced experienced staff turnover 	

								<ul style="list-style-type: none"> - Community satisfaction in the service deliver - Substantial budget increment in the sector to improve service delivery 	<ul style="list-style-type: none"> - Improving technical skills of existing staffs to fit the position in the organization
	Design and construction supervision Enterprises	758	428	378	221	49.5	100	<ul style="list-style-type: none"> - A 5% increment in the human resources development in the specific sector per year - Reduced experienced staff turnover - Community satisfaction in the service delivery - Substantial budget increment in the sector to improve service delivery 	<ul style="list-style-type: none"> - Hire and train new early mid-career professionals - Enhance technical and professional skills in the water sector through continuous tailored/specialized trainings - Improving work environment and remunerations
Amhara Regional State	Agriculture and Natural Resources	998		612	0	39	100	<ul style="list-style-type: none"> - A 3.9% increment in the human resources in the specific sector per year over 10 years - Substantial budget increment in the sector to improve service delivery 	<ul style="list-style-type: none"> - Develop feedback loops mechanisms for service quality - Mobilize more financial resources for human resources development
	Water and Irrigation Development	1420	7156	1250	680	77	100	<ul style="list-style-type: none"> - A 7.7% increment in the human resources in the specific sector per year over 10 years - Substantial budget increment in the 	<ul style="list-style-type: none"> - Designing short term/tailored training programs in various areas of water and make it accessible

								sector to improve service delivery	- Collaborate with public universities with MoU for human capacity building in the areas of water
	Health	144	543	48	181	67	100	A 6.7% increment in the human resources in the specific sector per year over 10 years Substantial budget increment in the sector to improve service delivery	
	Agriculture/irrigation development	2228	565	1116	281	50	100	- A 5% increment in the human resources development in the specific sector per year - Reduced experienced staff turnover - Community satisfaction in the service delivery - Substantial budget increment in the sector to improve service delivery	
Oromia Regional State	Water, Irrigation and Energy	1836	351	920	195	49	100	- A 4.9% increment in the human resources development in the specific sector per year - Reduced experienced staff turnover - Community satisfaction in the service delivery - Substantial budget increment	

								in the sector to improve service delivery	
	Health	727	-	328	41	49	100	<ul style="list-style-type: none"> - A 4.9% increment in the human resources development in the specific sector per year - Reduced experienced staff turnover - Community satisfaction in the service delivery - Substantial budget increment in the sector to improve service delivery 	
SNNP Regional State	Agriculture	692	544	680	544	20	100	<ul style="list-style-type: none"> - A 2% increment in the human resources development in the specific sector per year - Reduced experienced staff turnover - Community satisfaction in the service delivery - Substantial budget increment in the sector to improve service delivery 	
	Water, Irrigation and Energy	841	420	816	408	50	100	<ul style="list-style-type: none"> - A 5% increment in the human resources in the specific sector per year 	

								<ul style="list-style-type: none"> - Reduced experienced staff turnover - Community satisfaction in the service delivery - Substantial budget increment in the sector to improve service delivery 	
	Health	146	143	136	136	1	100	<ul style="list-style-type: none"> - A 0.1% increment in the human resources in the specific sector per year - Reduced experienced staff turnover - Community satisfaction in the service delivery - Substantial budget increment in the sector to improve service delivery 	

Note: Under the regional administrative offices there are Zonal and Woreda administrative levels. Hence, the associated numbers indicate the sum total number of required human resources water.

Strategy 2. Develop technical skills and leadership capacity

The current advanced development in water sector required a human capital with a necessary skill in operating and managing different water sector infrastructures. Across the country implementation capacity in all sectors including water is rated as weak. One of the reasons associated with this is because of lack of the required skills and leadership capacity in managing the resources. As a solution, the gap of skill and leadership capacity can be enhanced through continuous tailor made trainings and by applying a capacity development concept that employ a project cycle management , it is possible to support all intended future courses of action aimed at achieving specific objectives within a specific time frame. Through the process, training themes in line with the needs of water sector organizations at federal and regional offices will be organized. Here, systematic assessment will be conducted on the linkage between individual training and organizational development and on the application of knowledge and skills to deliver appropriate services in the water sector.

Under this water sector human capacity development framework, it is proposed to conduct a short term training that will be conducted from few days to a maximum of 6 months, at least two times in a year, on specific topics mostly associated with improving the skills and leadership capacity of professionals at higher education (university) and technical institutions in the sector at different levels. The following are the training themes (topics) that were proposed during the national consultation and validation workshop without prioritization. However, additional training topics can be also proposed in the future as needed, and could be selected.

University level trainings

1. Project management
2. Contract administration (related to construction management)
3. Software applications (related with water resources design and application)
4. Water resources assessment
5. Water resources infrastructure maintenance
6. Irrigation systems performance evaluation and improvement
7. Smart irrigation technologies
8. Water resources information and database application
9. Groundwater exploration and management, and geo-physics applications

Technical level trainings

1. Drilling techniques
2. Water quality monitoring

3. Operation and maintenance of water infrastructure
4. Community-based institutions for water infrastructure management

Strategy 3. Accelerate institutional and system transformation

The current organizational set up is becoming an obstacle to address the complex demands from the general public and implement progressive policy and strategies the country outlined. There was an attempt in the past to solve this problem by applying Business Process Re-Engineering (BPR) in all sectors. However, the institutional transformation through this approach was not successful as planned. One of the main reasons for the failure to this system transformation is BPR require a huge number of skilled professionals which can provide one-stop-shop services, change in the internal working environment, and infrastructure to implement the change.

The other associated but not main problem as mentioned before is all water sector organizations have not follow the same organizational structure that reach to the lowest administrative level called “Kebele”. For instance, Health and Agriculture has Kebele level institutional arrangements whereas water resource has no a kebele level institutional arrangements. Currently, there is an effort to decentralize the service related to water resource to kebele level. Hence, under this planning framework, it is envisaged to support the effort in accelerating the institutional arrangements and system transformation. Moreover, the following salient points which have been observed during the field assessment that have huge impact in relation to human capacity and dragging the institutional transformation and needs to be addressed in the coming years:

- 1) Streamline activities and mandates of various actors and institutions in the water sector
- 2) Provide proper laboratory services: Building state-of –the art water laboratories at the ministries and selected water related training institutes (MoWIE, few universities and research institutes)
- 3) Build IT infrastructures
- 4) Establish inter organizational partnership and ad-hoc (especially between water, agriculture and health) for interface
- 5) Establish proper monitoring and evaluation mechanisms
- 6) Provide proper office set-up and incentives for staffs

c. HCD Implementation framework

The training courses for university and TVET level trainings are not prioritized at this stage and are all included as agreed in consultations and validation workshops. The framework in Table 5 is summarized for the training implementation in Table 6. Prioritization and specific selection of courses can be easily made later.

Table 6. Details of the HCD training

Item	University training	Technical (TVET) training
Courses	Project management	Drilling techniques
	Contract administration (related to construction management)	Water quality monitoring
	Software applications (related with water resources design and application)	Operation and maintenance of water infrastructure
	Water resources assessment	Community-based institutions for water infrastructure management
	Water resources infrastructure maintenance	
	Irrigation systems performance evaluation and improvement	
	Smart irrigation technologies	
	Water resources information and database application	
	Groundwater exploration and management, and geo-physics applications	
Duration	Minimum 3 months Maximum 1 year	Minimum 1 month Maximum 3 months
Nature of the training	Theoretical aspects (50%) Practical (labs, group exercises, field work, design, etc. (50%)	Theoretical aspects (about 30%) followed by intensive practical exercises, laboratory analysis, field work, etc. (70%).
Expected start time	October 2019	October 2019
Training institutions	Addis Ababa, University (EiWR) Arba Minch University (AWTI) Bahir Dar University (IoT) Hawassa University (IoT)	Ethiopian Water Technology Institute (EWTI) Alage TVET college

d. Monitoring and evaluation

The key indicators identified for human capacity building in the water sector are:

- Rate of increase per year in professionals in different water sector organizations
- Rate of experienced staff turnover
- Degree of attainment of national goals and SDGs
- Community satisfaction in the service delivery related to water
- Increment in budget allocated for the water sector

Accordingly, the monitoring and evaluation plan for the water sector HCD framework is shown in Table 7.

Table 7. Monitoring plan for the water sector HCD

Goals/ Objectives, Outcomes, Activities		Indicators	Means of verification	Risks and Assumptions	Responsible
Goals/ Objective s	To increase the number of professionals so as to attain a 100% fulfillment by 2030	Rate of increase in waters sector human resources every year as per the specification	Surveys made annually at selected water sector organizations for numbers of water sector professionals	Government's commitment in ensuring sustainable water resources management continues	
	To reduce the water sector staff turnover to at least by half every year				
	To develop skills and knowledge in the water sector				
	To attain national plans (GTPs) and hence SDGs related to water at national levels				
	To increase water laboratory services thereby enhancing accessibility for research and HCD				
	To attain a substantial increase in the budget allocated for the water sector so that the budget for water sector HCD meaningfully increases				
Outcomes	Number of water related professionals/technical staff at different sub-sectors have increased every year as specified in the HCD framework at regional and federal levels	Rate of experienced staff turnover as compared the previous year	Conducting skills surveys	The national economy will continue to grow to commit increasing budget for the sector	
	Suitable working conditions created for Water sector professionals and technical staff; and staff motivation ensured	Degree of attainment GTP plans and SDGs related to water (% attainment)	Staff satisfaction surveys annually		
	National development plans (GTPs) and SDGs related to water are attained by 2030	Number of water laboratories established	Monitoring national improvements in attainment of plans and SDG goals related to water		
	State-of-the art Water laboratories increased to at least 5 by 2030				
	Budget allocated for the water sector continuously increased by 15% every year				
Outputs/ Activities	Improve technical skills of existing staffs Hire and train new early mid-career professionals			National efforts in the	Federal Ministries

<p>Enhance technical and professional skills in the water sector through continuous tailored/specialized trainings Improve work environment and remunerations Develop feedback loops mechanisms Mobilize more financial resources for HCD Collaboration with Universities Design tailored/short term/long term training programs</p>	<p>Increment in budget allocated for the water sector</p>	<p>National assessment in water sector laboratory services</p>	<p>water sector are synergized</p>	<p>Regional governments Regional water sector bureaus</p>
<p>Improve work environment and remuneration packages Develop feedback loops mechanisms Mobilize more financial resources for HCD</p>		<p>Accessibility surveys for water laboratories for research and training</p>	<p>Support from development partners continues</p>	<p>Federal Ministries Regional governments Regional water sector bureaus</p>
<p>Improving technical skills of existing staffs Hire and train new early mid-career professionals Improve work environment and remunerations Develop feedback loops mechanisms Mobilize more financial resources for HCD Collaboration with Universities Design tailored/short term/long term training programs</p>		<p>Assessment on yearly basis on the budget dedicated to the sector</p>		<p>Federal Ministries Regional governments Regional water sector bureaus</p>
<p>Solicit funds to establish water quality, hydraulic and irrigation laboratories Commit government budget to the sector</p>				<p>Development partners Ministries Universities</p>
<p>Mobilize more financial resources for HCD Enhance collaborations with both national and international partners</p>				<p>Federal Ministries</p>

	Increase government budget for the sector				Regional governments Regional water sector bureaus
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5. Conclusions

The water sector in Ethiopia is currently characterized by poor infrastructure, less experienced sector human capacity and low service delivery. Data collected from various institutions involved in the water sector and stakeholder consultations revealed there is a large gap in both skills and numbers of water related human capacities. There is also large gap in infrastructure such as ICT and laboratories which are directly related to HCD. The largest gap in human capacities is the one at technical levels responsible for installation, operation and maintenance of water infrastructure in a sustainable way. Continuous skills development scheme is lacking and as a result there appears a big skills gap at technical levels. In some sub-sectors of water, however, the problem is not only skills gap, but also it is non-existent for the positions sought. On the other hand, for the professional levels, human capacity in terms of numbers is not a big challenge. However, human resources at professional levels generally lack state-of-the-art knowledge and skills in using techniques, technologies and methodologies for water resources engineering and management. This needs to be addressed through tailored/short term and long term university level training schemes.

ANNEXES

Annex 1. List of validation workshop participants

No	Name	Organization
1	Dr. Zeleke Agide	Ethiopian Institute of Water Resources, AAU
2	Dr. Elias Tedla	Ethiopian Institute of Water Resources, AAU
3	Mr. Taffere Addis	Ethiopian Institute of Water Resources, AAU
4	Mr. Abayneh Melaku	Ethiopian Institute of Water Resources, AAU
5	Ms. Hayat Nuredin	Ethiopian Institute of Water Resources, AAU
6	Dr. Mekonen Ayana	Adama Science and Technology University
7	Dr. Habtamu Hailu	Addis Ababa Science and Technology University
8	Dr. Geremew Sahilu	Addis Ababa University
9	Mr. Tegenu Zerfu	Meta Meta Research
10	Mr. Abiti Getaneh	Ministry of Water, Irrigation and Energy
11	Mr. Ermias Alemu	Ethiopian Design and Supervision Works Corporation
12	Mr. Elias Awol	Ministry of Agriculture and Livestock Resources
13	Mr. Alemayehu Hailu	Southern Region Water resources Development Bureau
14	Mr. Engida Bekele	Southern Region Water resources Development Bureau
15	Mr. Gemedali	Oromia Irrigation Development Authority
16	Mr. Zeleke Belay	Ministry of Agriculture and Livestock Resources
17	Mr. Molla Fetene	Amhara region Water Resources Development Bureau
18	Mr. Ashenafi Belayhun	Amhara region Health Bureau
19	Mr. Hailu Engidayehu	Amhara region Agriculture and Natural Resources Bureau

Annex 2. Agenda of the validation workshop



Development of Water Sector Human Capacity Framework for Ethiopia

Validation Workshop (23rd January 2019), Top Ten Hotel, Addis Ababa

Time	Activity	Responsible	Facilitator
2:30-9:00	Registration	Ms. Hayat Nuredin	
9:00-9:10	Welcome address	Dr. Elias Tedla	
9:10-9:30	Presentation about EiWR and the HCD project	Dr. Zeleke Agide	
9:30-9:40	Water sector HCD presentation for Amhara Region	Mr. Taffere Addis	Dr. Elias T.
9:40-9:50	Water Sector HCD presentation for SNNPR Region	Ms. Hayat Nuredin	Dr. Elias T.
9:50-10:00	Water Sector HCD presentation for Oromia Region	Mr. Abayneh Melaku	Dr. Elias T.
10:00-10:15	Water Sector HCD Presentation at national level (MoWIE)	Mr. Abayneh Maleku	Dr. Zeleke A.
10:15-10:30	Water Sector HCD Presentation at national level (MoAL)	Mr. Abayneh Maleku/Zeke Belay	Dr. Zeleke A.
10:30-10:45	Presentation of the draft HCD strategies	Dr. Elias Tedla	Dr. Zeleke A.
10:45-11:00	Health Break	Participants	
11:00-11:15	Presentation on water related trainings by EWTI	Mr. Abebe Mekonnen	Dr. Zeleke A.
11:15-12:45	Discussion and feedback on Water Sector HCD at regional and national levels	Participants	Dr. Elias and Dr. Zeleke
12:45-13:45	Lunch and Networking	Participants	

Annex 3. Minutes of the validation workshop

National Water Sector Human Capacity Development Framework for Ethiopia
Minutes of the validation workshop
23 January 2019, Top ten Hotel, Addis Ababa, Ethiopia

Participants

No	Name	Organization
1	Dr. Zeleke Agide	Ethiopian Institute of Water Resources, AAU
2	Dr. Elias Tedla	Ethiopian Institute of Water Resources, AAU
3	Mr. Taffere Addis	Ethiopian Institute of Water Resources, AAU
4	Mr. Abayneh Melaku	Ethiopian Institute of Water Resources, AAU
5	Ms. Hayat Nuredin	Ethiopian Institute of Water Resources, AAU
6	Dr. Mekonen Ayana	Adama Science and Technology University
7	Dr. Habtamu Hailu	Addis Ababa Science and Technology University
8	Dr. Geremew Sahilu	Addis Ababa University
9	Mr. Tegenu Zerfu	Meta Meta Research
10	Mr. Abiti Getaneh	Ministry of Water, Irrigation and Energy
11	Mr. Ermias Alemu	Ethiopian Design and Supervision Works Corporation
12	Mr. Elias Awol	Ministry of Agriculture and Livestock Resources
13	Mr. Alemayehu Hailu	Southern Region Water resources Development Bureau
14	Mr. Engida Bekele	Southern Region Water resources Development Bureau
15	Mr. Gameda Oli	Oromia Irrigation Development Authority
16	Mr. Zeleke Belay	Ministry of Agriculture and Livestock Resources
17	Mr. Molla Fetene	Amhara region Water Resources Development Bureau
18	Mr. Ashenafi Belayhun	Amhara region Health Bureau
19	Mr. Hailu Engidayehu	Amhara region Agriculture and Natural Resources Bureau

Agenda

1. To discuss on the national challenges, needs and priorities related to water sector HCD and validate the HCD framework for Ethiopia

Out of the expected about 30 participants from various institutions (Ministries, Enterprises and regional state bureaus engaged in the water sector), 19 participants attended the validation workshop. The workshop started with welcoming address and continued with subsequent presentations and discussions.

Explanation was made to the participants about the initiation of the project on water sector human capacity development project and the processes undertaken. Explanation was also made about the purpose of the validation workshop and expected outcomes. Then presentations were invited on the results of stakeholders consultations at federal and regional levels. Accordingly, 5 presentations were made to present the current status and expected number of professionals in various specializations related to water.

The followed a presentation on the water sector human capacity development strategies drafted based on the stakeholder consultation results. The framework was presented to consist of 3 strategic pillars; namely:

Strategy 1. Progressive development in human resources in the water sector

Strategy 2. Develop technical skills and leadership capacity

Strategy 3. Accelerate institutional and system transformation

After this presentation, the floor was opened for discussions and feedback from stakeholders on the information collected through consultations and the draft framework. There were very interesting and valuable feedback received. The major key issues raised, among others are:

- Planned delivery of short term tailored trainings in various professional areas in the water sector; including water well drilling technologies, project management, study and design of water projects, operation and maintenance, water quality monitoring, laboratory analysis, modeling, etc.
- Launching water related technical trainings in the existing technical, vocational, education and training institutes (TVETs) and expanding more for the same;
- Establishing state-of the art water laboratories for the ministries and selected universities/research institutes/training institutes to assist in research and human capacity development/training;
- Improving pay scale for technical staff engaged in the water sector, as technical issues related to design, installation, operation and maintenance are the main challenges to the sector;
- Extension services in the water sector: extension in the water sector is limited and this resulted in poor water management and service delivery. Extension workers in irrigation and water supply sectors need to be trained and deployed;
- Capacity building in contacts administration for water projects and in project management.

The participants acknowledged the fact that the HCD framework is framed under three pillars. They provided valuable feedback on the issues to be considered/included under the three strategic pillars of HCD framework and recommended accommodation of the feedbacks and sharing with them at a later stage.

Item	University training	Technical (TVET) training
Courses	Contract administration (related to construction management)	Drilling techniques
	Software applications (related with water resources design and application)	Water quality monitoring
	Water resources assessment	Operation and maintenance of water infrastructure
	Water resources infrastructure maintenance	Community-based institutions for water infrastructure management
	Irrigation systems performance evaluation and improvement	
	Water resources information and database application	
	Groundwater exploration and management, and geo-physics applications	
Duration	Minimum 3 months Maximum 6 year	Minimum 3 month Maximum 6 months
Nature of the training	Theoretical aspects (50%) Practical (labs, group exercises, field work, design, etc. (50%)	Theoretical aspects (about 30%) followed by intensive practical exercises, laboratory analysis, field work, etc. (70%).
Expected start time	October 2019	October 2019
Training institutions	Addis Ababa, University (EiWR) Arba Minch University (AWTI) Bahir Dar University (IoT) Hawassa University (IoT)	Ethiopian Water Technology Institute (EWTI) Alage TVET college

Ethiopian Institute of Water resources

Addis Ababa University

National Strategy on Water Sector Human Capacity Development for Ethiopia (Supported by UNESCO)

Data collection and consultation form (for Institutions in the water sector)

Institution: _____ Data provided by (Name) _____ Tel: _____ Date of data Collection: _____

Region	Number of woredas	Required Number of experts by profession (water) in each woreda					Actual Number of experts by profession in water in each woreda					Required number of experts by profession (water) at head office + Design & Construction enterprises+ zonal offices					Actual number of experts by profession (water) at head office + Design & Construction enterprises+ Zonal offices					
		Specialization	Avg No	Dip	BSc	MSc	Specialization	Avg No	Dip	BSc	MSc	Specialization	Avg No	Dip	BSc	MSc	Specialization	Avg No	Dip	BSc	MSc	

Sub-Sector: Water bureau/Agriculture Bureau/Health Bureau	Date: Time: Place:
	Respondent name: Position:
	Responses
1) Critical gap/challenges in the water sectors <ul style="list-style-type: none"> • Trainings 	
<ul style="list-style-type: none"> • Infrastructure 	
<ul style="list-style-type: none"> • Human resources/ capacity limitations 	

<ul style="list-style-type: none"> • System/ Institutional arrangement 	
<p>1) Success stories/Best practice in the water sector</p> <ul style="list-style-type: none"> • Training 	
<ul style="list-style-type: none"> • Infrastructures 	
<ul style="list-style-type: none"> • Human resources 	
<ul style="list-style-type: none"> • System/Institutional arrangement 	

<p>2) Required capacity development in water sector in the form of:</p> <ul style="list-style-type: none">• TVET trainings	
<ul style="list-style-type: none">• University trainings	
<ul style="list-style-type: none">• Infrastructure/laboratories	